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New Claims

1. A powder for use in the production of three-dimensional structures or molded bodies by means of layered manufacturing methods (powder-based generative rapid prototyping method), e.g. pursuant to SLS (Selective Laser Sintering) or to laser melting technology, comprising a first fraction that is present in the form of substantially spherical powder particles (18; 118; 218; 330; 430) and that is formed by a matrix material, and at least one further fraction in the form of strengthening and/or reinforcing fibers (140; 240; 340; 440), characterized in that the medium length L50 of the fibers (140; 240) maximally corresponds to the value of the medium grain size d50 of the spherical powder particles (118; 218; 330; 430).

2. The powder according to claim 1, wherein the medium grain size d50 of the spherical powder particles lies in the range from 20 to 150, preferably from 40 to 70 μm.

3. A powder for use in the production of three-dimensional structures or molded bodies by means of layered manufacturing methods (powder-based generative rapid prototyping method), e.g. pursuant to SLS (Selective Laser Sintering) or to laser melting technology, comprising a first fraction that is present in the form of substantially spherical powder particles (18; 118; 218; 330; 430) and that is formed by a matrix material, and at least one further fraction in the form of strengthening and/or reinforcing fibers (140; 240; 340; 440), characterized in that the medium grain size d50 of the spherical powder particles is in the range from 20 to 150, preferably from 40 to 70 μm.

4. The powder according to any of claims 1 to 3, wherein the volume fraction of the fibers (140) is up to 25%, preferably up to 15%, especially preferred up to 10%.

5. The powder according to any of claims 1 to 4, wherein the fibers and the matrix material are mixed.

6. The powder according to any of claims 1 to 3, wherein the fibers (240; 340; 440) are embedded into the matrix material (118; 330), preferably such that they are substantially fully enclosed by the matrix material.

7. The powder according to claim 6, characterized in that the volume fraction of the fibers (240; 340; 440) is greater than 15%, preferably greater than 25%.

8. A powder for use in the production of three-dimensional structures or molded bodies by means of layered manufacturing methods (powder-based generative rapid prototyping method), e.g. pursuant to SLS (Selective Laser Sintering) or to laser melting technology, comprising a first fraction that is present in the form of substantially spherical powder particles (18; 118; 218; 330; 430) and that is formed by a matrix material, and at least one further fraction in the form of strengthening and/or reinforcing fibers (140; 240; 340; 440), characterized in that the fibers (240; 340; 440) are embedded into the matrix material (118; 330), preferably such that they are substantially fully enclosed by the matrix material.

9. The powder according to claim 8, characterized in that the volume fraction of the fibers (240; 340; 440) is

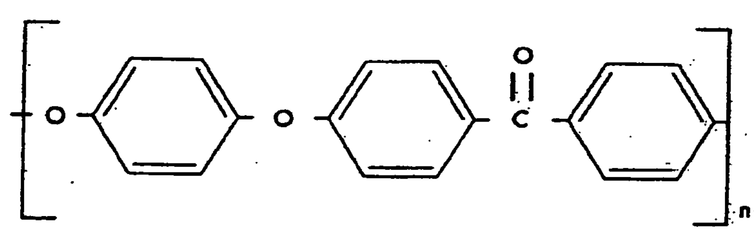
greater than 15%, preferably greater than 25%, and especially preferred greater than 30%.

10. The powder according to any of claims 1 to 9, characterized in that the matrix material is formed by a thermoplastic plastic material.

11. The powder according to claim 10, characterized in that the matrix material is formed by a higher-networked polyamide such as PA11 or PA12.

12. The powder according to any of claims 1 to 11, characterized in that the fibers are formed by carbon and/or glass fibers.

13. The powder according to any of claims 1 to 9, characterized in that the matrix fraction is formed by an aromatic polyetherketone, in particular a polyaryletherketone (PEEK) plastic with the repeating unit Oxy-1,4-Phenylen-Oxy-1,4-Phenylen-Carbonyl-1,4-Phenylen



14. The powder according to any of claims 1 to 9, characterized in that the matrix material is formed by a metallic material.

15. The powder according to claim 14, characterized in that the fibers are selected from the group of ceramic and of boron fibers.

16. The powder according to claims 14 or 15, wherein the medium grain size d50 of the spherical powder particles lies in the range from 10 to 100, preferably from 10 to 80 μm.

17. A method for the production of a powder according to any of claims 1 to 13, comprising substantially spherical powder particles consisting of a thermoplastic matrix material, into which strengthening and/or reinforcing fibers are optionally embedded, said method comprising the following method steps:

a) preparing a suspension with a matrix micro powder (22; 322) having a particle size that lies substantially below the size of the powder particle to be produced and optionally strengthening and/or reinforcing fibers (340) having a length below the size of the powder particles to be produced being stirred into a liquid phase (20; 320);

b) spraying the suspension through a nozzle for forming droplets (32, 332) comprising matrix micro powder and optionally fibers; and

c) evaporating and/or volatilizing the volatile fraction (26; 326) of the droplets, so that substantially spherical agglomerates (30; 330) are left.

15. A method for the production of a powder according to any of claims 14 to 16, comprising substantially spherical powder particles (330) consisting of a metallic matrix material, into which strengthening and/or reinforcing fibers (340) are embedded, said method comprising the following method steps:

a) preparing a suspension with a matrix micro powder (322) having a particle size that lies substantially be-

low the size of the powder particle to be produced and strengthening and/or reinforcing fibers (340) having a length below the size (DP) of the powder particles to be produced being stirred into a liquid phase (320);

b) spraying the suspension through a nozzle for producing droplets (332) comprising matrix micro powder and fibers; and

c) evaporating and/or volatilizing the volatile fraction (326) of the droplets, so that substantially spherical agglomerates (330) are left.

19. The method according to claim 17, wherein micro powders (22; 322) with a medium grain size d50 between 3 and 10 μm, preferably 5 μm, and optionally fibers (340) with a medium length L50 from 20 to 150 μm, preferably from 40 to 70 μm are used.

20. The method according to claim 18, wherein micro powders (322) with a medium grain size d50 between 3 and 10 μm, preferably 5 μm, and fibers (340) with a medium length L50 from 10 to 100 μm, preferably from 10 to 80 μm are used.

21. The method according to any of claims 17 to 20, characterized in that the liquid phase is an ethanol or an ethanol/water mixture.

22. The method according to any of claims 17 to 21, characterized in that the spraying of the suspension is performed such that substantially spherical micro droplets (32; 332) with a medium diameter d50 from 10 to 70 μm are produced.

23. The method according to any of claims 17 to 22, characterized in that the evaporating or volatilizing step is performed while the droplets (32; 332) are moved through a heating path.

24. A method for the production of a powder according to any of claims 1 to 13, comprising substantially spherical powder particles (430) consisting of a thermoplastic matrix material, into which strengthening and/or reinforcing fibers (440) are optionally embedded, said method comprising the following method steps:

a) cooling coarse granulate (450) of optionally fiber-reinforced plastic material below a temperature at which an embrittlement of the matrix material occurs;

b) grinding the cooled granulate; and

c) separating the ground good in correspondence with a predetermined fractional spectrum.

25. The method according to claim 24, characterized in that the step of grinding is performed by means of a peg mill (460).

26. The method according to claims 24 or 25, characterized in that the step of grinding is performed with further cooling.

27. The method according to any of claims 24 to 26, characterized in that the method step of separating is performed by means of an air separator (480).

28. The method according to any of claims 24 to 27, characterized in that the ground good is subject to a smoothing treatment.

29. The method according to claim 28, characterized in that the smoothing treatment is performed by the embedding or agglomerating of micro or nano particles such as Aerosil.

30. A method for the production of a powder according to any of claims 1 to 16, comprising substantially spherical powder particles consisting of a matrix material, into which strengthening and/or reinforcing fibers are optionally embedded, said method comprising the following method steps:

a) transferring the matrix material to a liquid phase;

b) optionally stirring the fibers into the liquid phase;

c) blowing the liquid phase that optionally comprises the fibers through a nozzle for producing droplets that optionally comprise fibers; und

d) guiding the droplets through a solidifying path.

31. The method according to claim 30, characterized in that the liquid phase is obtained by fusing of the matrix material, and that the melt that optionally comprises the fibers is blown and subsequently guided through a cooling path.

32. The method according to claim 31, characterized in that the atomization of the melt is performed in a hot gas jet.

33. The method according to any of claims 30 to 32, characterized by the further method step of separating

the powder particles in correspondence with a predetermined fractional spectrum.

34. A method for the production of three-dimensional structures or molded bodies by means of layered manufacturing methods (powder-based generative rapid prototyping method), using a powder according to any of claims 1 to 16.

35. The method according to claim 34, wherein SLS (Selective Laser Sintering) or laser melting technology are used as layered manufacturing method.

36. A molded body that can be obtained by means of a layered manufacturing method (powder-based generative rapid prototyping method) according to claims 34 or 35, using a powder according to any of claims 1 to 16.

37. The molded body according to claim 36, comprising interior, preferably three-dimensional framework-like struts.